299-E33-15 (A4842)

Log Data Report

Borehole Information:

Borehole: 299-E33-15 (A4842)			Site: 216-B-8 Crib		
Coordinates (WA State Plane)		GWL (ft)[1]: 229.1		GWL Date: 12/01	
North	East	Drill Date	TOC[2] Elevation (ft)	Total Depth (ft)	Type
137540.698 m	573810.298 m	10/53	630.63	251	Cable tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel (welded)	2.5	8.625	8.0	0.3125	0	238.5

Borehole Notes:

The casing depth information, drill date, total depth, and type of drilling equipment provided above is derived from a well construction and completion summary obtained from *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells* (Ledgerwood 1993). The nominal casing size information for the 8-in. steel casing and stickup is confirmed from tape and caliper measurements collected in the field by MACTEC-ERS personnel. The groundwater level was measured from the TOC by the Duratek Federal Services well service crew during extraction of a pump prior to logging. Coordinates and the TOC elevation are derived from the Bechtel Hanford Incorporated (BHI) Hanford Wells Information System (HWIS[3]) database.

According to the completion summary, in October 1992 the 8-in. casing was over-drilled to 18 ft in depth with a 15-in. hollow stem auger and grout was placed around the 8-in. casing. A 4-ft by 4-ft concrete pad was placed at the surface to complete the seal. The casing was extended 1.04 ft at this time.

The Hanford Wells completion summary reports an 8-in. casing had been placed to 238.5 ft where basalt was encountered; the borehole was drilled to a total depth of 251 ft. Perforations were made in the 8-in. casing from 222 to 237 ft.

Logging Equipment Information:

Logging System: Gamma 2B		Type: SGLS (35%)
Calibration Date: 11/01	Calibration Reference:	GJO-2002-287-TAR
	Logging Procedure:	MAC-HGLP 1.6.5

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4 Repeat	
Date	01/22/02	01/23/02	01/24/02	01/25/02	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth	2.5	89.0	240.0	237.0	
Finish Depth	90.0	174.0	173.0	213.0	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	

Log Run	1	2	3	4 Repeat	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
ft/min	n/a[4]	n/a	n/a	n/a	
Pre-Verification	B0063CAB	B0064CAB	B0065CAB	B0066CAB	
Start File	BA0063000	BA0064000	BA0065000	BA0066000	
Finish File	BA0063175	BA0064170	BA0065134	BA0066048	
Post-Verification	BA0063CAA	BA0064CAA	BA0065CAA	BA0066CAA	

Logging Operation Notes:

Spectral gamma logging was performed in this borehole during January 2002 on four separate days. The sonde was placed inside a plastic bag during logging to prevent the possibility of cross contamination from the groundwater. A repeat section was collected in this borehole during log run 4 from 213 to 237 ft in depth.

Logging measurements are referenced to the top of the 8-in. casing.

Analysis Notes:

Analyst:	Henwood	Date:	02/06/02	Reference:	MAC-VZCP 1.7.9 Rev. 2

Pre-run and post-run verification spectra met the acceptance criteria. The pre-run verification data were used for the energy and resolution calibration necessary to process the data collected from the first portion of the day and the post-run verification for the latter part of a day for log runs 2, 3, and 4; the post-run data were used for log run 1.

A casing correction for a 0.3125-in.-thick casing was applied to 238.5 ft in depth; the borehole is apparently open between 238.5 and 240 ft. A water correction was applied to data below 229.1-ft depth.

Each spectrum collected during a log run was processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with an EXCEL worksheet template identified as G2BNOV01.xls using an efficiency function and corrections for casing and water as appropriate. No dead time corrections were necessary as the dead time did not exceed 10.5 percent. The ^{214}Bi peak at 609 keV was used to determine the naturally occurring ^{238}U concentrations rather than the ^{214}Bi peak at 1764 keV. The 609-keV energy peak generally exhibited slightly better count rates and less error than the 1764-keV peak.

Log Plot Notes:

Separate log plots are provided for the man-made radionuclides (^{137}Cs and ^{60}Co) detected in the borehole, naturally occurring radionuclides (^{40}K, ^{238}U, ^{232}Th [KUT]), a combination of man-made, KUT, total gamma, and dead time, a repeat section, and a comparison plot of man-made radionuclides from data collected in 1997 by Waste Management Federal Services (WMFS) NW and the current SGLS data. This comparison plot is included to assess the possibility of movement of contaminants in the vadose zone. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, casing corrections, or water corrections.

Results and Interpretations:

^{137}Cs and ^{60}Co were detected in this borehole. ^{137}Cs was detected near its MDL of about 0.3 pCi/g at the ground surface, 98 ft, and at about 223 ft in depth. ^{60}Co contamination was detected between 222 ft and total logging depth at 240 ft. The maximum ^{60}Co concentration was about 11 pCi/g at the bottom of the logged interval (240 ft). The depths of contamination appear to coincide with historical groundwater levels. It is possible historical groundwater levels rose to about the 222-ft level, leaving residual contamination in the sediments as the groundwater receded to the current levels at about 229 ft.

The KUT log profiles indicate only subtle variations in the sediments. On the basis of the ^{40}K concentrations, the grout seal is in place to about 21 ft in depth. The decrease in ^{40}K concentrations at about 193 ft is interpreted as the top of the Hanford H3, which consists of more coarse-grained material than the overlying Hanford H2. The low ^{40}K concentration measured at 239 ft probably indicates the top of the basalt.

A repeat logging section shows generally good agreement in radionuclide concentrations and depth.

A comparison log plot of data collected in 1997 by the WMFS Radionuclide Logging System (RLS) and in 2002 with the SGLS is included. The RLS concentration data (^{137}Cs and ^{60}Co) were decayed to the date of the SGLS logging event in January 2002. The comparison generally shows good agreement between the logging systems. The profile for both ^{137}Cs and ^{60}Co has remained about the same between the logging events. However, the calculated concentrations of ^{60}Co are slightly higher in concentration in 2002 than would be expected on the basis of decay. This discrepancy could be the result of different characteristics of the logging systems, calibrations, or assumptions used to correct the data, or it could indicate movement of contamination.

References:

Ledgerwood, R.K. *Summaries of Well Construction Data and Field Observations for Existing 200-East Resource Protection Wells*, WHC-SD-ER-TI-007, Revision 0, Westinghouse Hanford Corporation, Richland, Washington.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] n/a – not applicable

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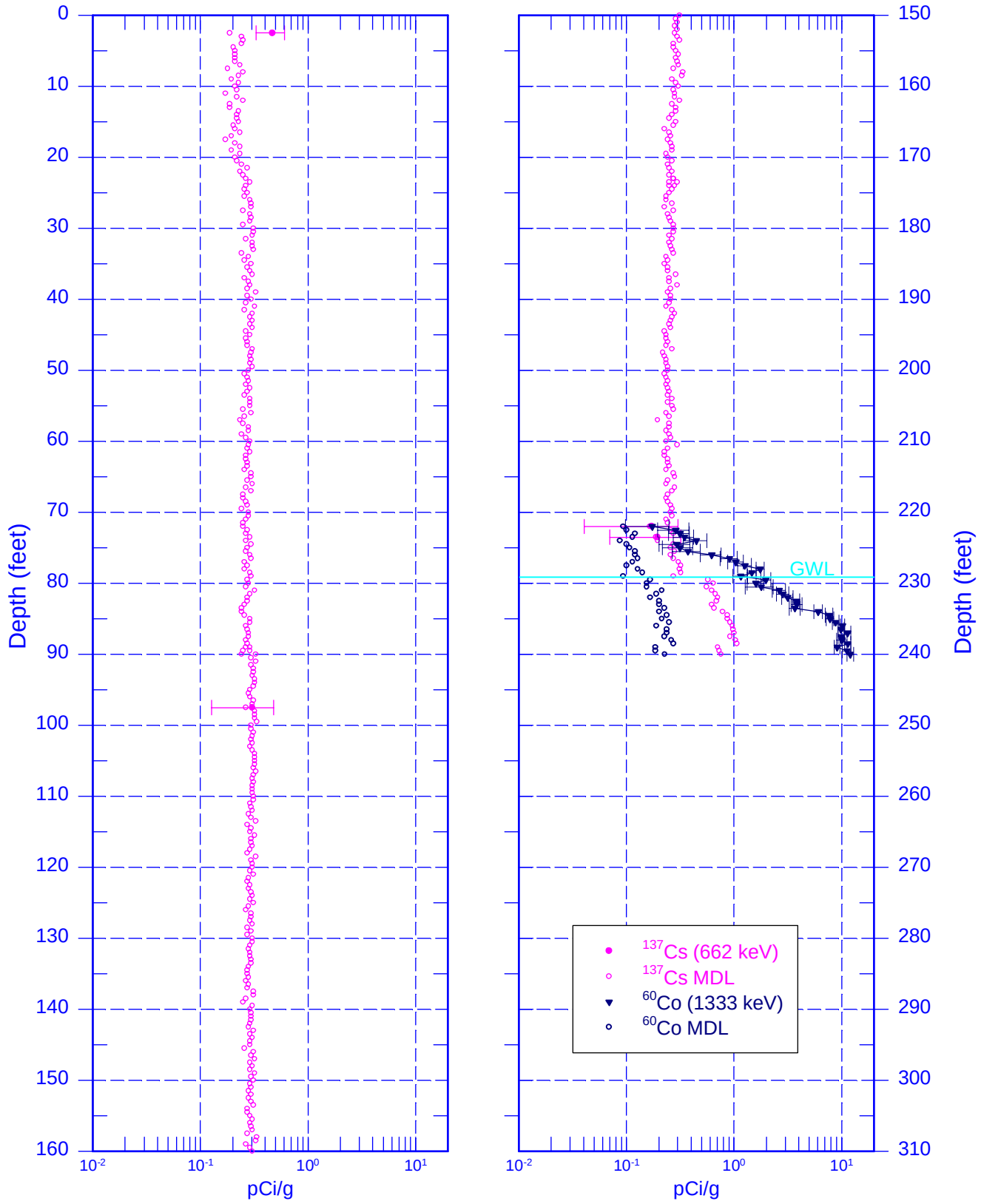
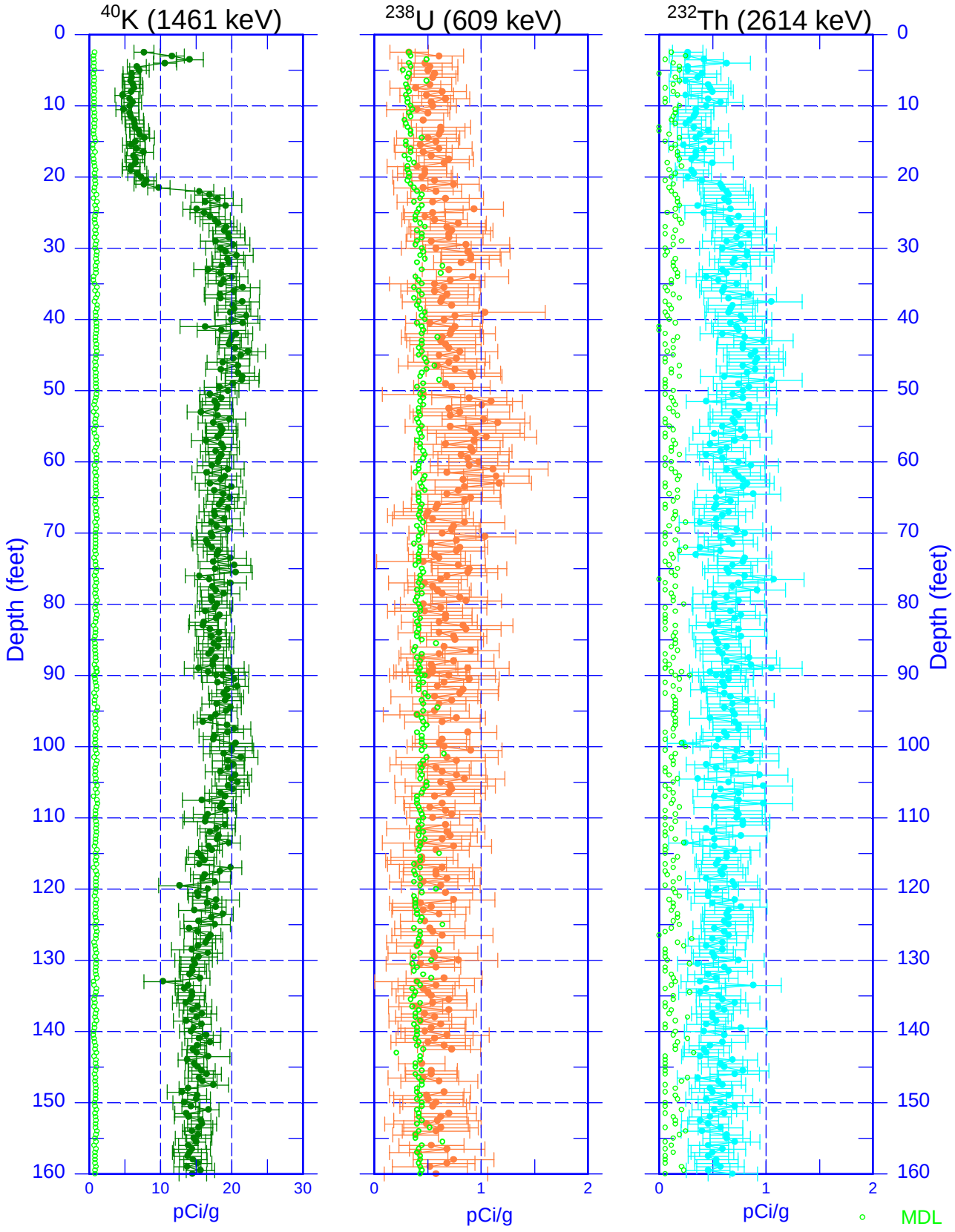
Man-Made Radionuclide Concentrations

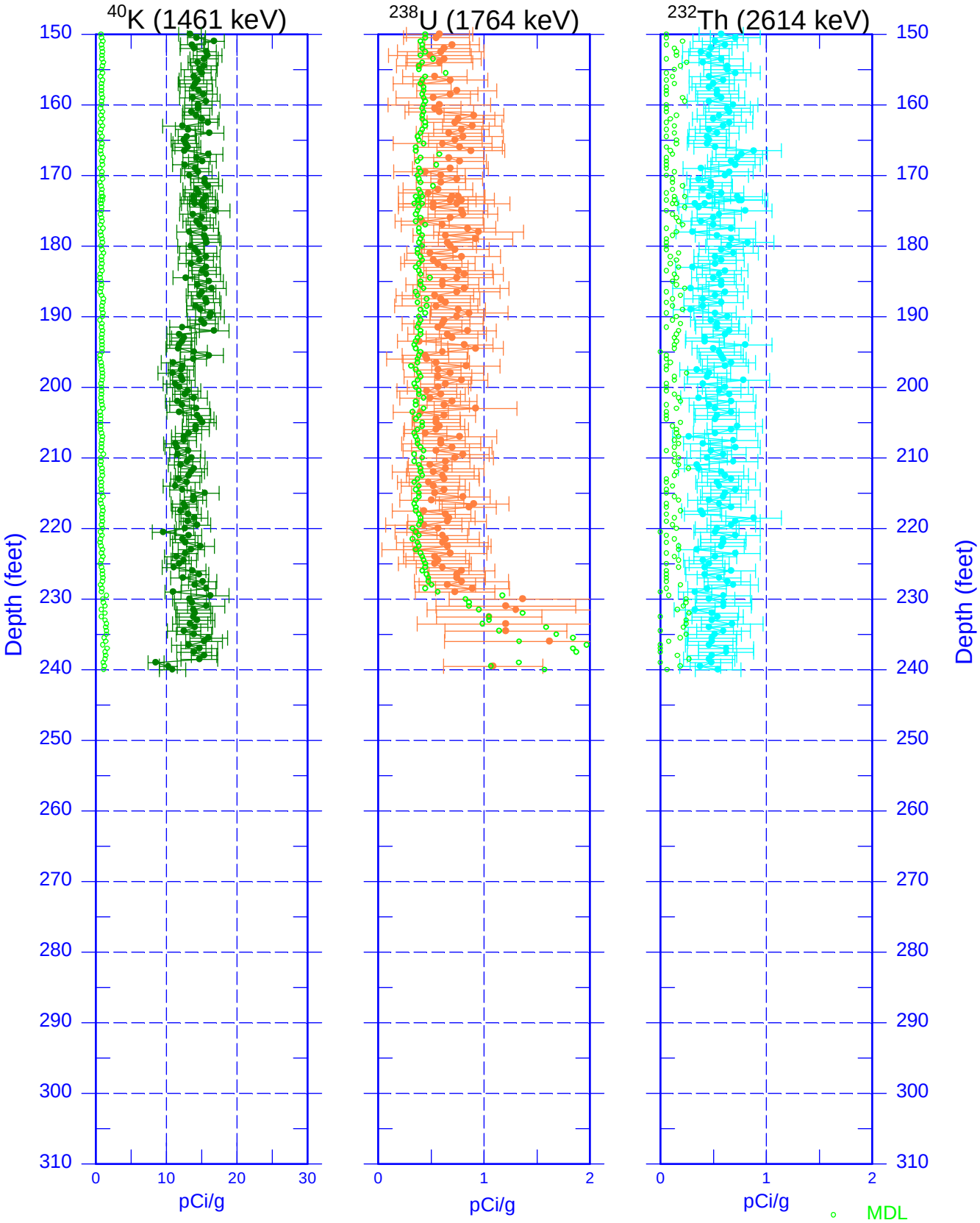


299-E33-15 (A4842)
Natural Gamma Logs

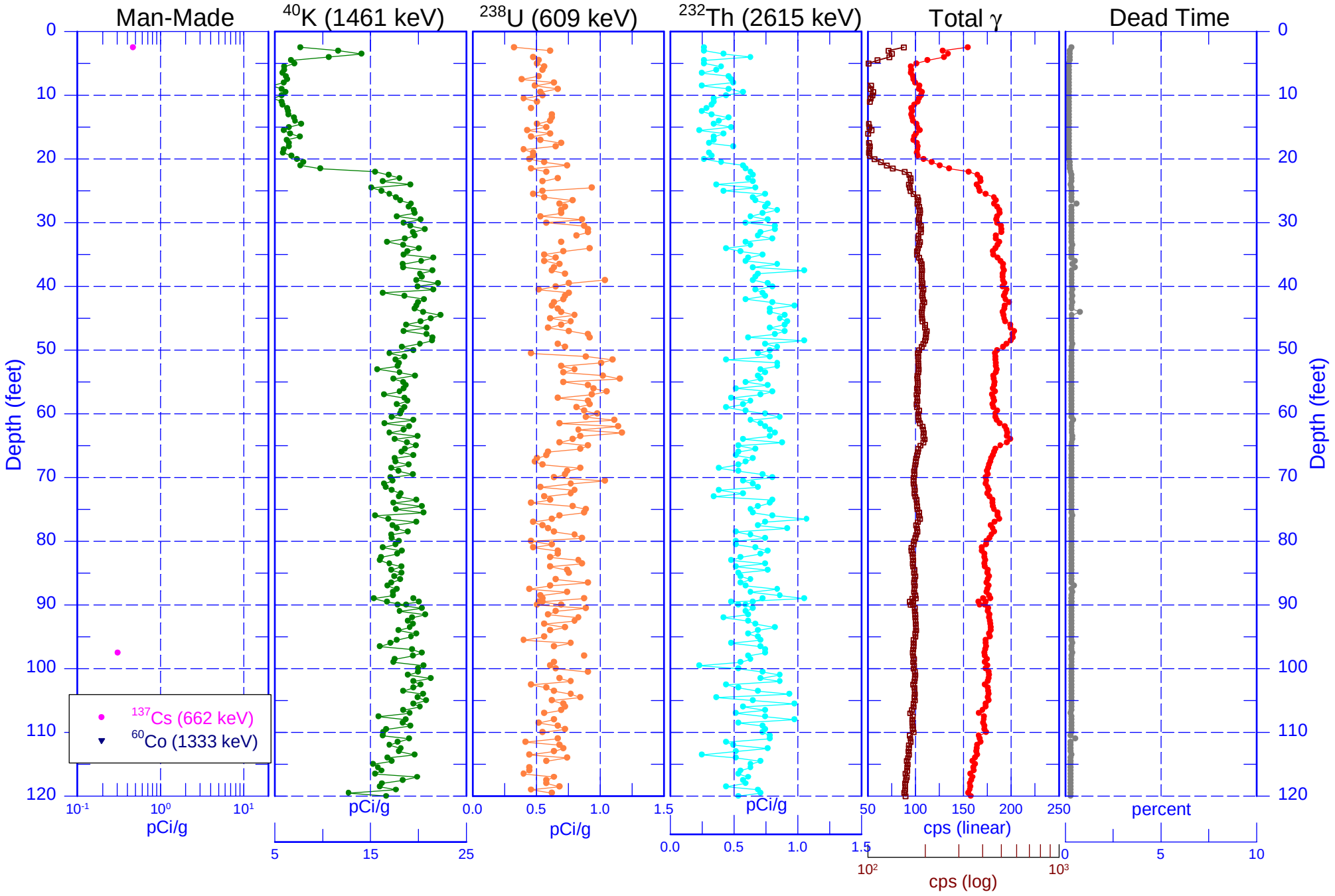


299-E33-15 (continued)

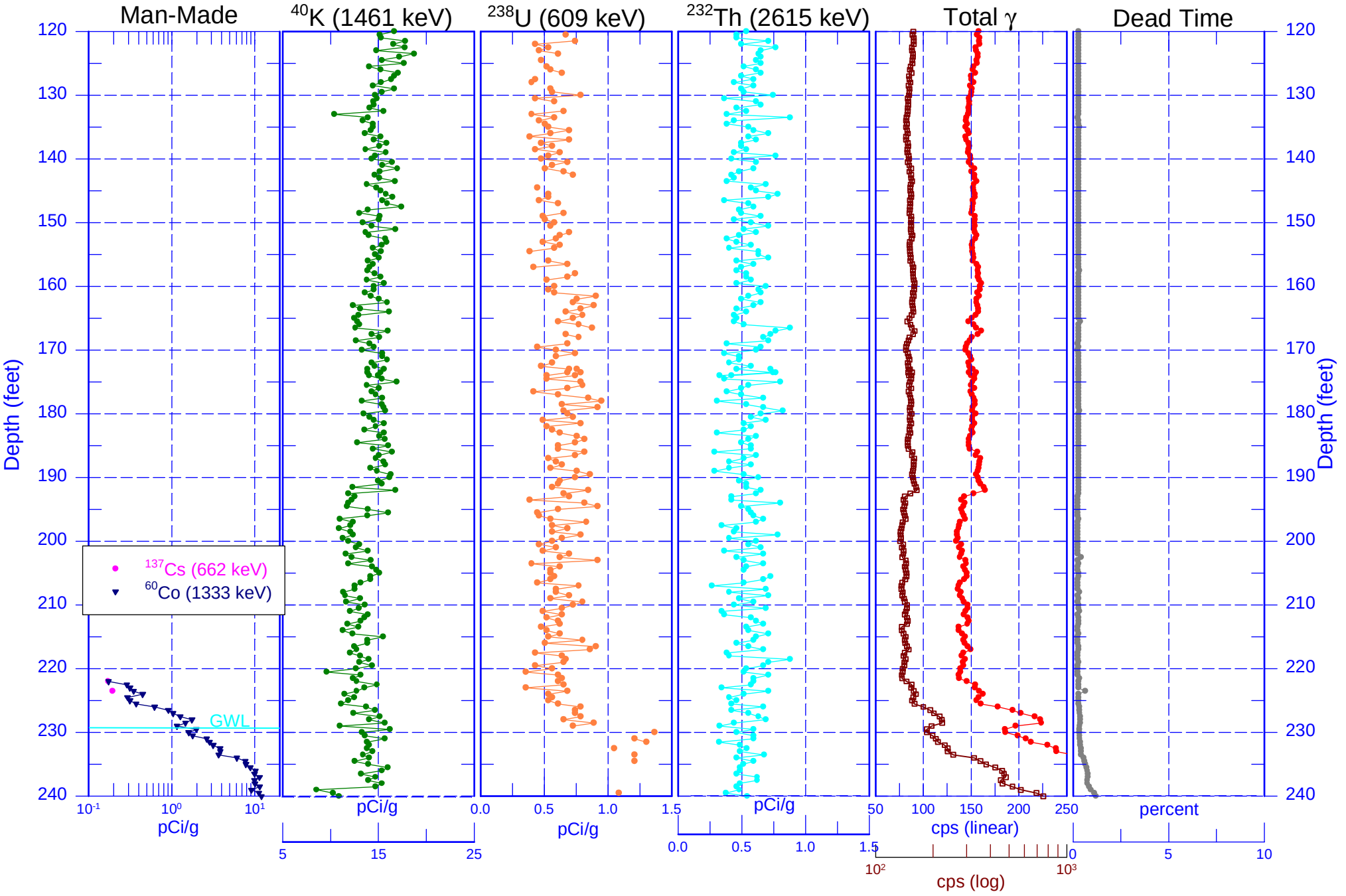
Natural Gamma Logs



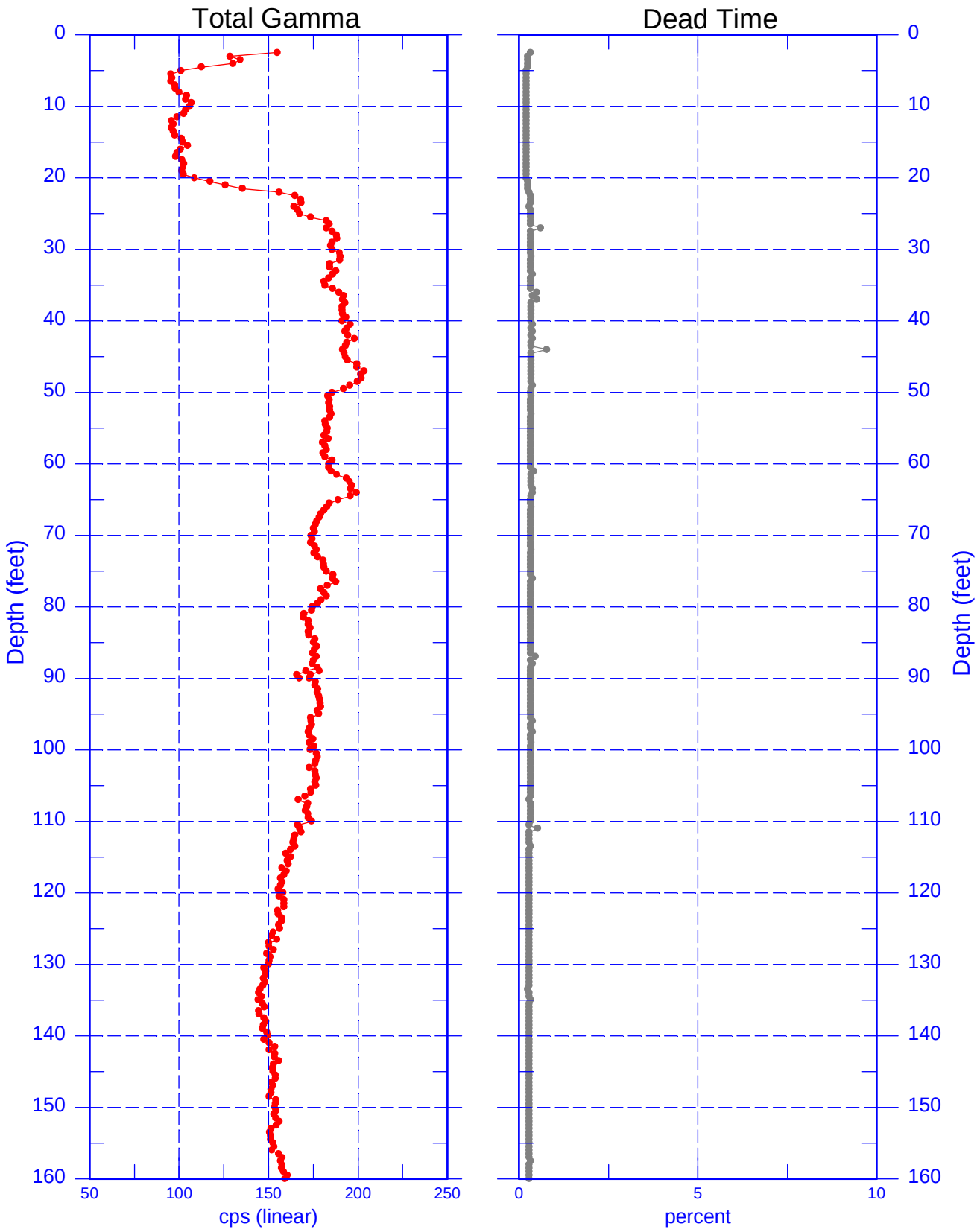
299-E33-15 (A4842) Combination Plot



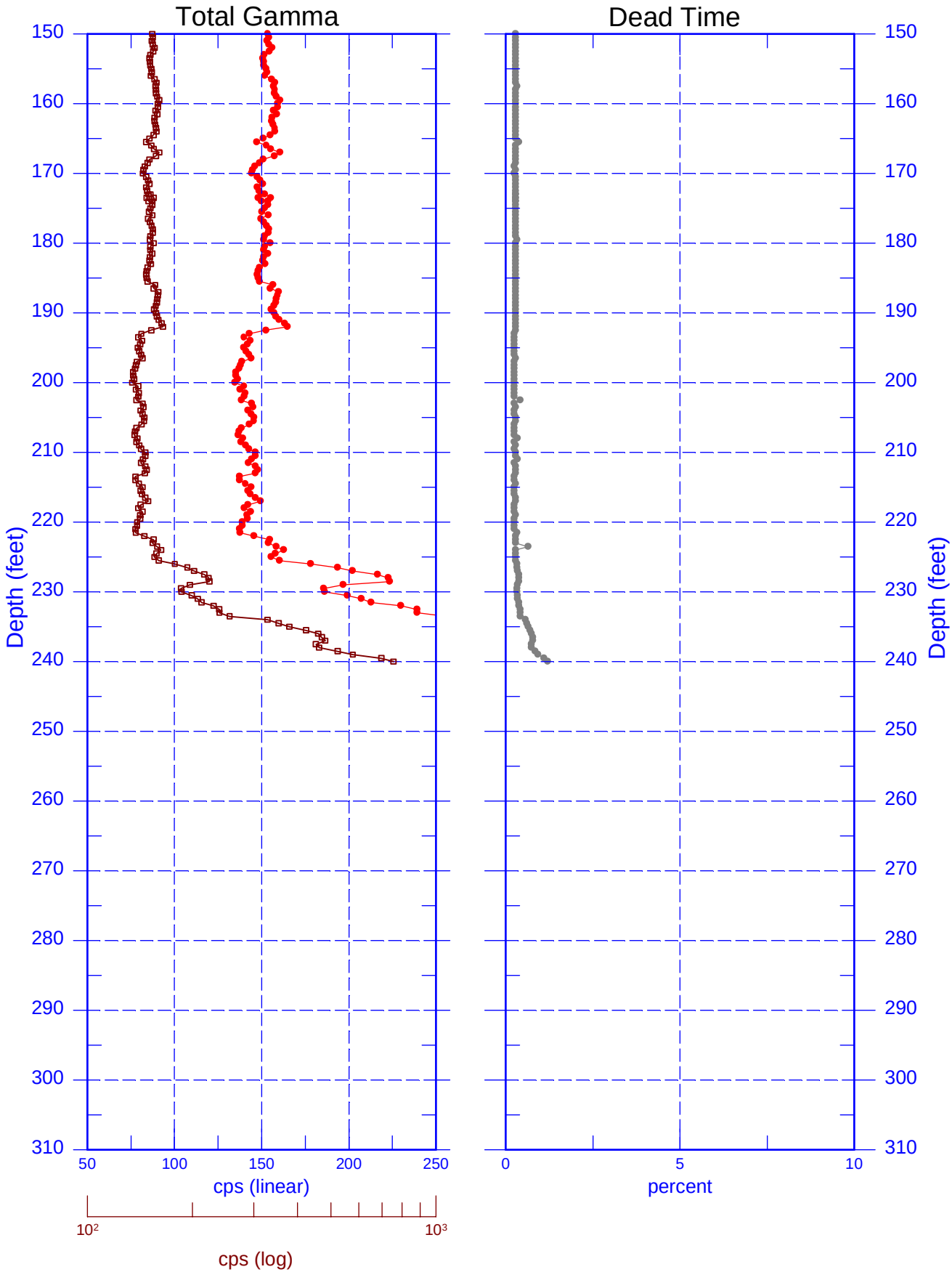
299-E33-15 (A4842) Combination Plot (continued)



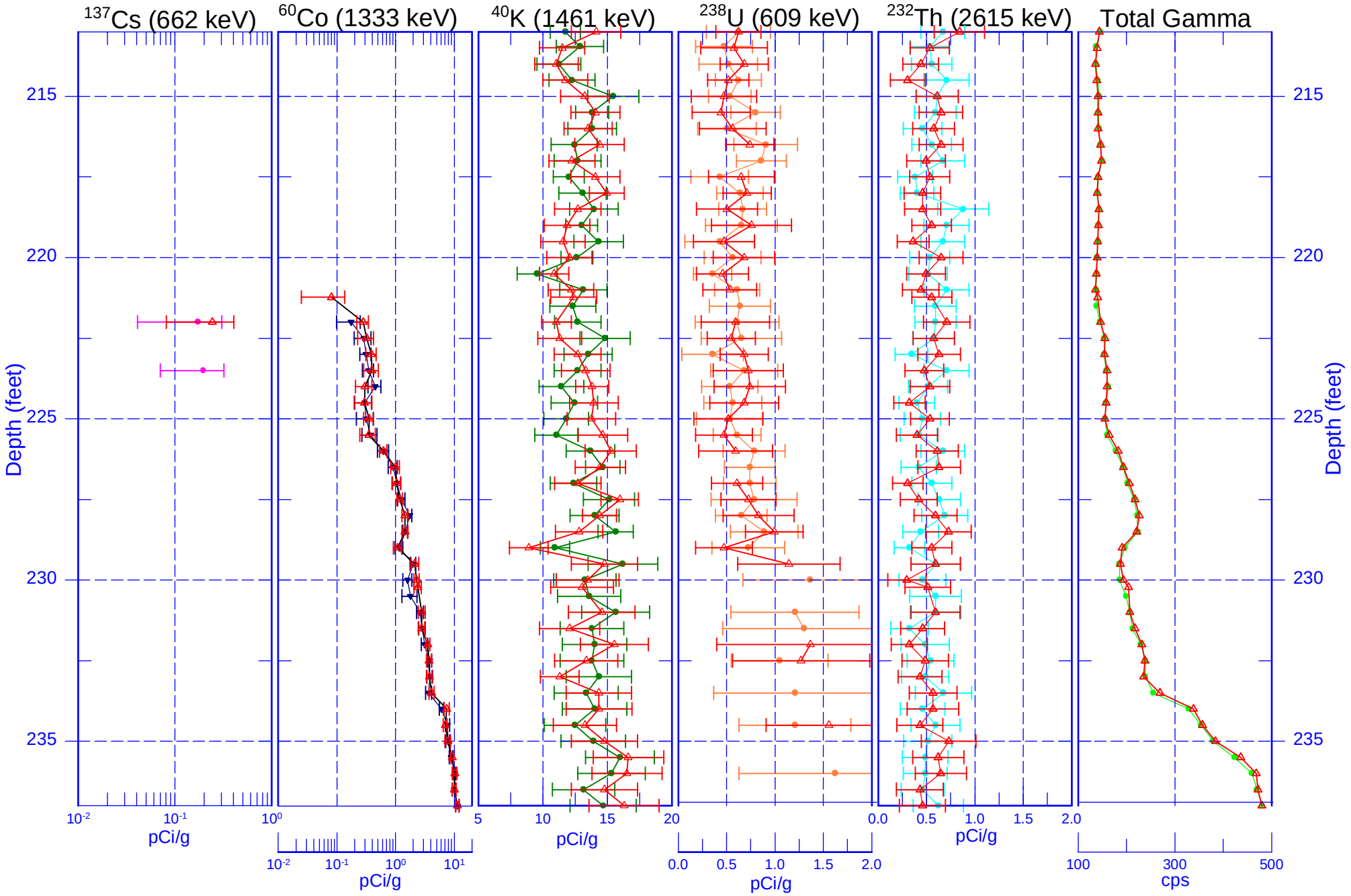
299-E33-15 (A4842)
Total Gamma & Dead Time



299-E33-15 (A4842)
Total Gamma & Dead Time



299-E33-15 (A4842) Repeat Section



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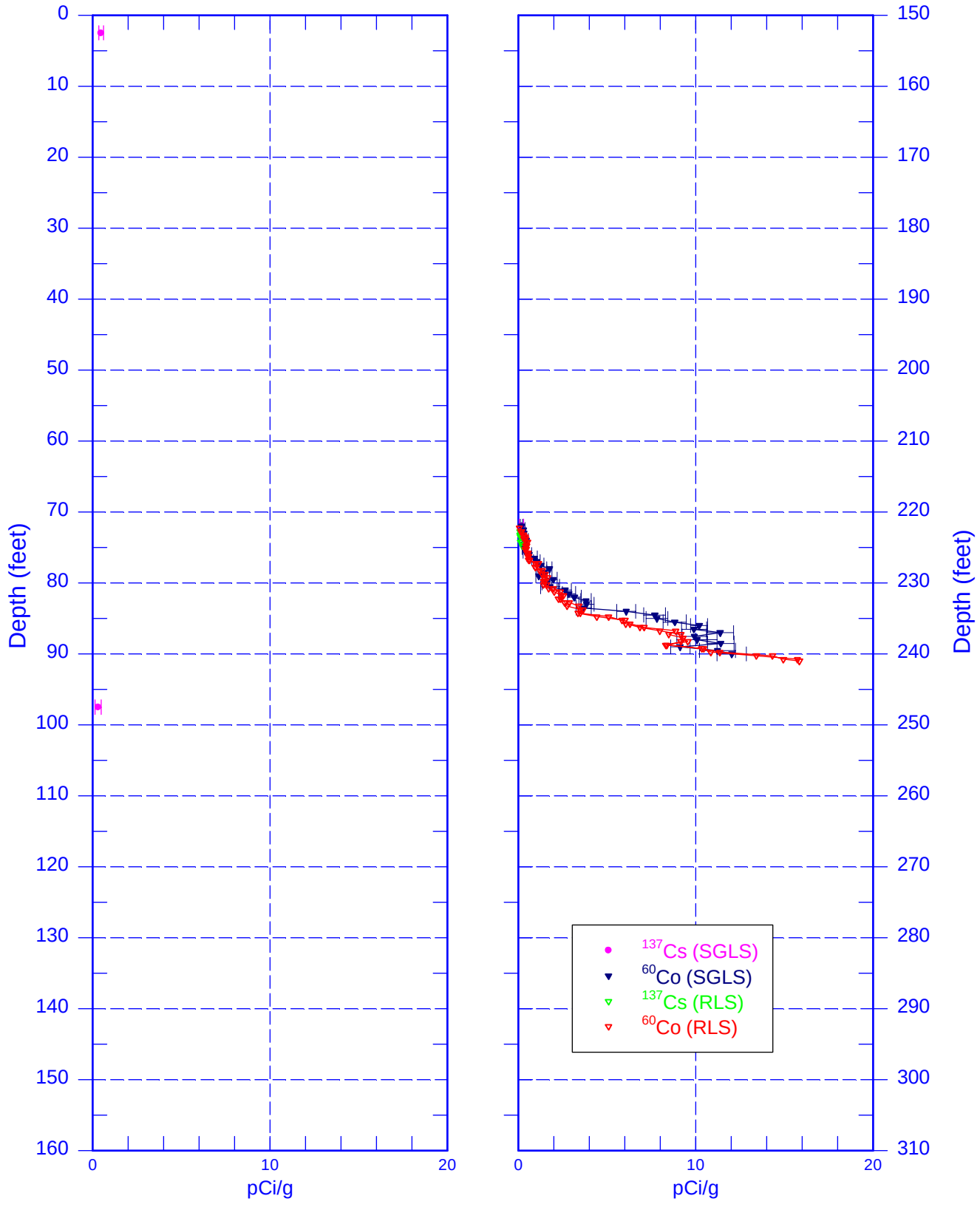
RLS (1997) and SGLS (2002) Comparison Logs



All concentrations decayed to 01/22/02